

ENGINEERING REPORT

1110 N. Glebe Road, Suite 800

Arlington, VA 22201

PREDICTED ANALOG INTERFERENCE TO WFRC CH 213C3 COLUMBUS, GA

Within WFRC 44 dBu: 401,2905 persons in 3970 sq. mi.

Within WFRC 60 dBu: 249,845 persons in 906 sq. mi.

Net interference-free service area: 271,000 persons in 1,656 sq. mi.

Interference from Station:	Affected area sq. mi:	% of 44 dBu area:	Affected population:	% of 44 dBu total:
WGNP	293	7.4	4,136	1.0
WKWV	73	1.8	3,042	0.8
WMMV	257	6.5	5,973	1.5
WPWB	1,516	38.2	54,373	13.5
WUOG	117	2.9	3,388	0.8
WVAS	1,090	0.3	104,283	26.0

There is no predicted interference within WFRC's 60 dBu service contour.

**Figures 8 through 10**

**Examples of "Best-case" Interference**

# PREDICTED ANALOG INTERFERENCE TO KPDQ-FM CH 229C PORTLAND, OR

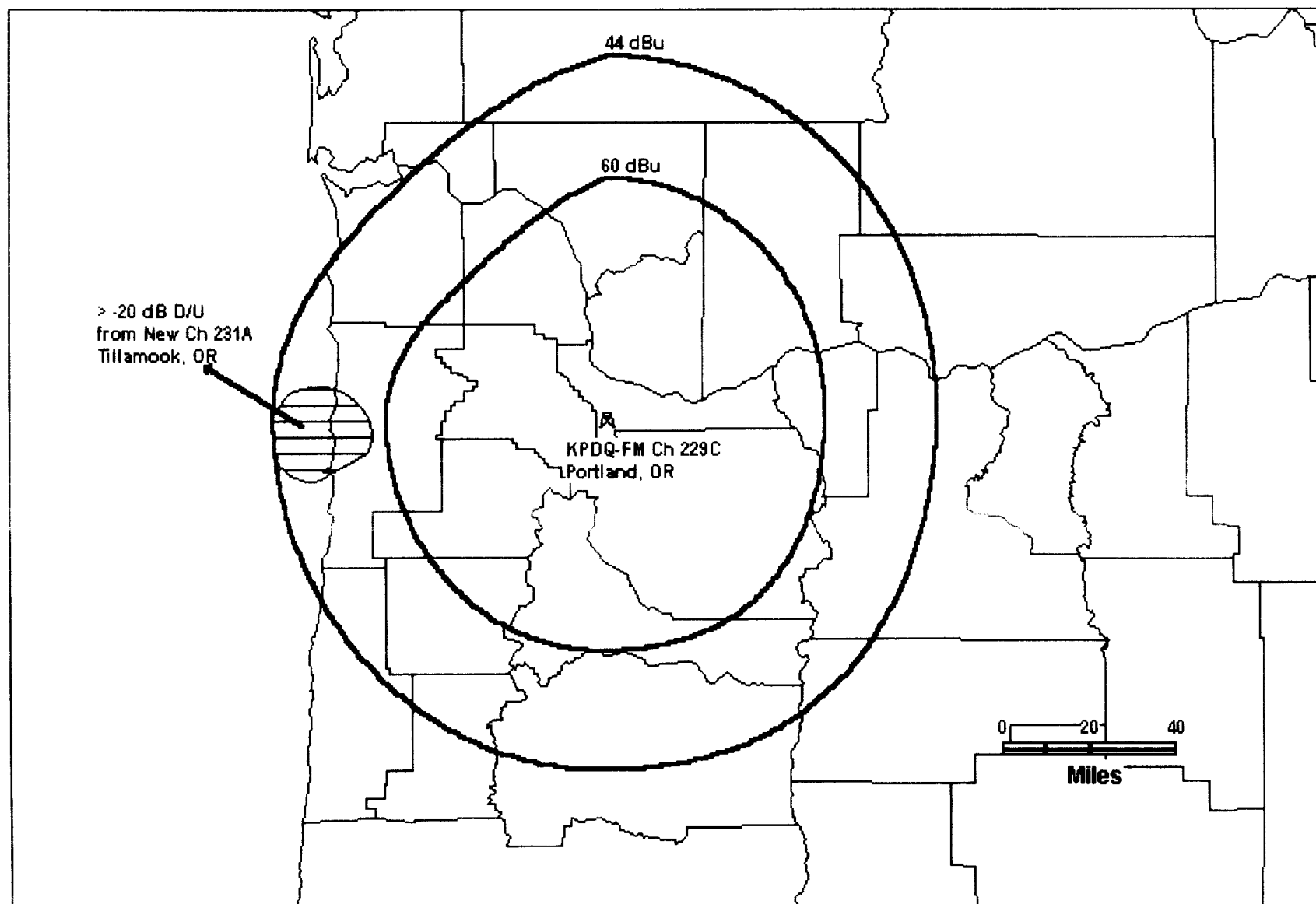


FIGURE 8

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**Within KPDQ-FM 60 dBu: 1,791,273 persons in 7413 sq. mi.**

No Interference

**Within KPDQ-FM 44 dBu: 2,123,274 persons in 16,435 sq. mi.**

<b>Interference from Station:</b>	<b>Affected area sq. mi:</b>	<b>% of Total:</b>	<b>Affected Population:</b>	<b>% of Total:</b>
NEW (CP)	135	0.8	9,591	0.5

# PREDICTED ANALOG INTERFERENCE TO KSLZ CH 299C1 ST. LOUIS, MO

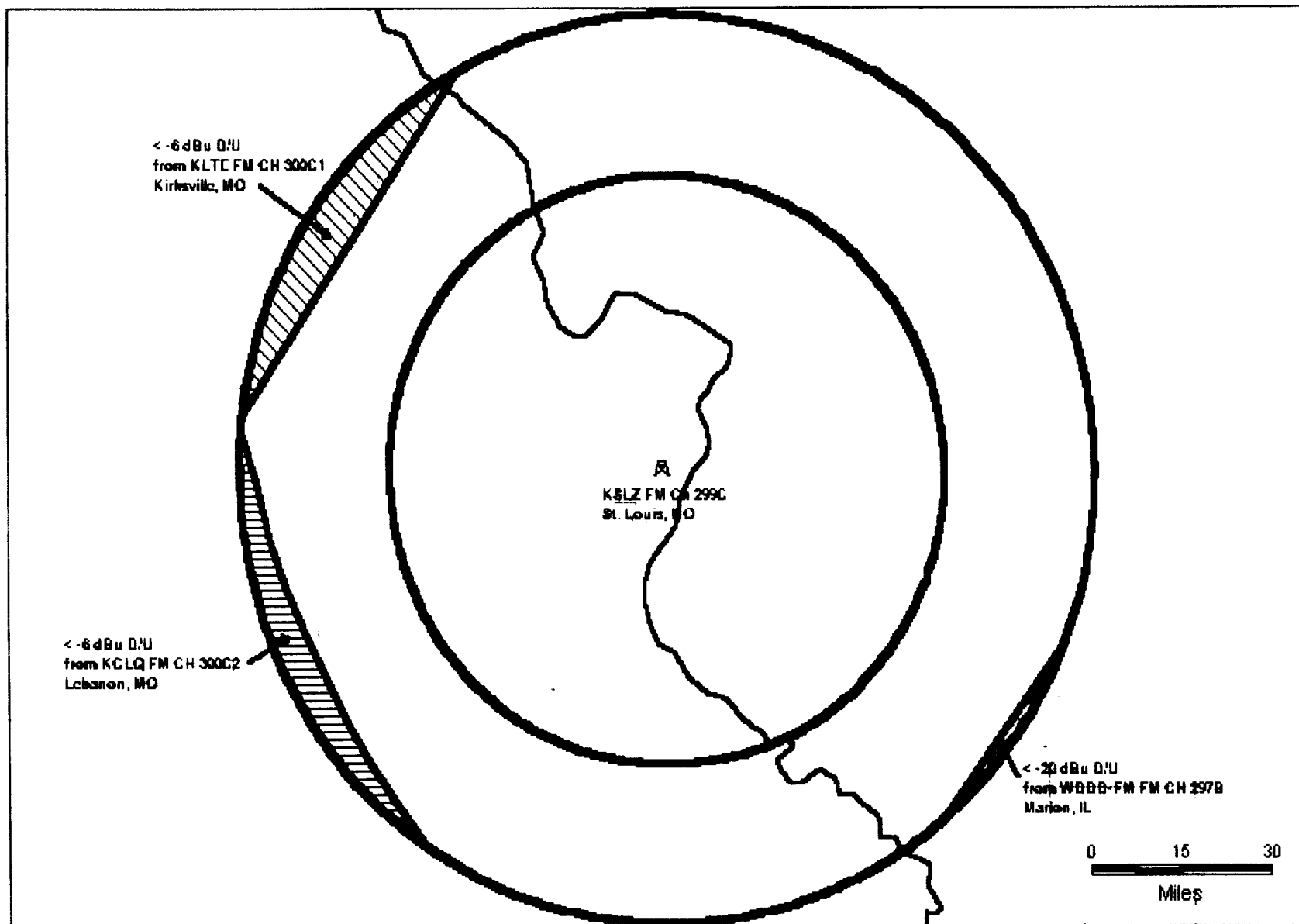


FIGURE 9

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**PREDICTED ANALOG INTERFERENCE TO KSLZ CH 299C SAINT LOUIS, MO**

**Within KSLZ 60 dBu: 2,493,802 persons in 6,519 sq. mi.**

No Interference

**Within KSLZ 44 dBu: 2,846,595 persons in 15,480 sq. mi.**

<b>Interference from Station:</b>	<b>Affected area sq. mi:</b>	<b>% of Total:</b>	<b>Affected Population:</b>	<b>% of Total:</b>
KLTE	311	2.0	6,622	0.2
KCLQ	280.1	1.8	12,270	0.4
WDDDFM	57.79	0.4	6,979	0.2

# PREDICTED ANALOG INTERFERENCE TO WAFX CH 295C SUFFOLK, VA

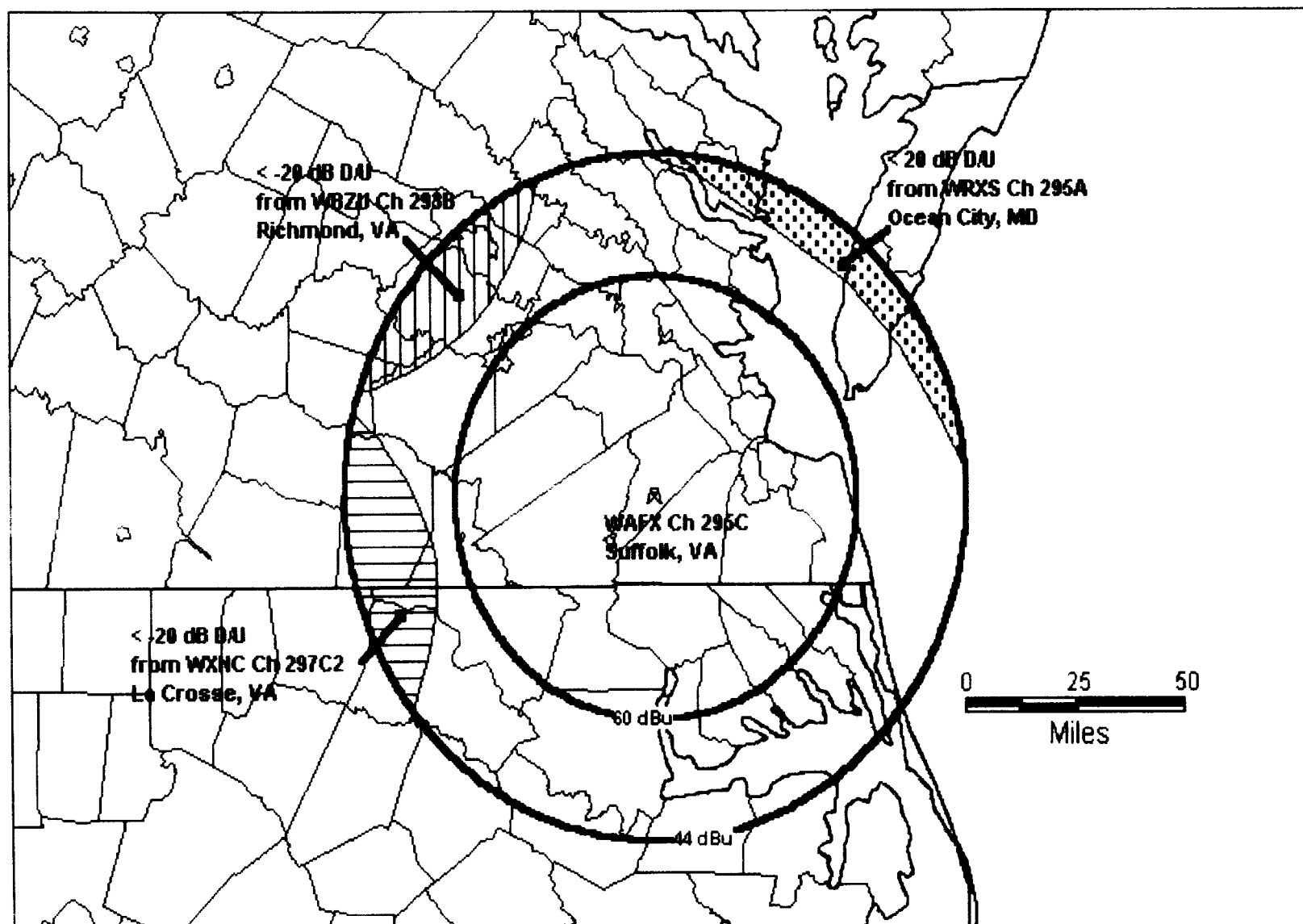


FIGURE 10

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**Within WAFX 60 dBu: 1,587,051 persons in 6,362 sq. mi.**

No Interference

**Within WAFX 44 dBu: 2,449,519 persons in 15,220 sq. mi.**

<b>Interference from Station:</b>	<b>Affected area sq. mi:</b>	<b>% of Total:</b>	<b>Affected Population:</b>	<b>% of Total:</b>
WBZU	625	4.1	485,549	19.8
WRXS	618.7	4.1	12,513	0.5
WXNC	751.7	4.9	40,284	1.6

## **Overall Interference Area Studies**

Overall interference studies were also completed to produce "bottom line" coverage and interference areas for each station in the conterminous United States. In this phase, areas of predicted noise limited coverage and interference were determined for each station based upon the interference ratios described above. As will be described in detail later, coverage and interfering field strength are predicted for each station. The propagation curves of the Commission rules are used to calculate desired and undesired field strength. From this data, various types of interference studies may be completed. In the studies, the type of interference is not recorded; otherwise the data files would be excessively large. In this case, combinations of interference to the same area are generally not considered. In other words an area receives interference or is lost if interference is predicted from at least one station. However, areas and population data are computed for each station. The studies were then rerun with pertinent interference ratios adjusted to predict the impact of DAB. The methodology used in these studies is shown in Supplement D.

Maps showing predicted service and interference were prepared for each FM channel for each study. Because there are 100 maps for each study, these maps are not included in the petition. However, four sample maps, Figures 15 through 18, are included. These maps show the present predicted analog coverage and interference. Noise limited coverage (44 dBu or greater) and the area lost to interference from all cochannel, first adjacent and second adjacent channel stations are shown. A channel in the center of the NCE band (211), and three channels (260, 261 and 262) near the center of the commercial band were selected. One of the commercial channels selected, 261, was formerly reserved for Class A operation. By selecting three channels in succession, some first adjacent channel impact can be seen. There are areas on the maps where cochannel stations are widely spaced and it appears that additional stations could be "dropped in". For example, on channel 261 (100.1 MHz) there is an area in the west of approximately one million square miles where there are no licensed stations. There are ten entire states in the area including Oregon, Washington, Arizona, New Mexico and the Dakotas. However, drop ins are generally not feasible or are limited to relatively low powered facilities in remote areas. It is difficult to allot new stations to these areas because of the large adjacent channel spacing requirements for FM; the first adjacent channel requirement is particularly restrictive. Between stations of the same class the first adjacent channel spacing requirement is as great as 83 percent of the cochannel requirement. To fill in these holes the Commission created reduced facilities classes of stations, such as Class B1 and C3 and permitted all classes, including class A stations, on all channels as long as the zone is appropriate. Also, as discussed above all FM was originally allotted on a protected contour basis and a distance separation scheme was developed to match the contour model. There was no attempt to develop an allocation plan to allocate stations on a more or less geographical lattice, which would distribute interference approximately equally among the stations. As a result some stations

receive little or no interference even within the noise limited contour and other stations are severely impacted. To be universally applicable, a DAB system must operate effectively for the worst case stations.

#### Results of the Studies

The results of the studies indicate that within the protected contour the majority of stations--approximately 90 percent--lose less than 10 percent of their predicted coverage to interference, however there are stations that lose substantial coverage. Many of the stations with substantial losses are located in the largest markets, and therefore have large populations affected. As expected, interference is common with a station's noise limited contour. The median station serves approximately 60 percent of its potential noise limited coverage area. Only approximately 10 percent of stations serve 90 percent or more of their noise limited areas.

[illegible]

**Legend**

■ Interference  
● Coverage

Prepared by



99.9 MHz Analog

Prepared by

Legend

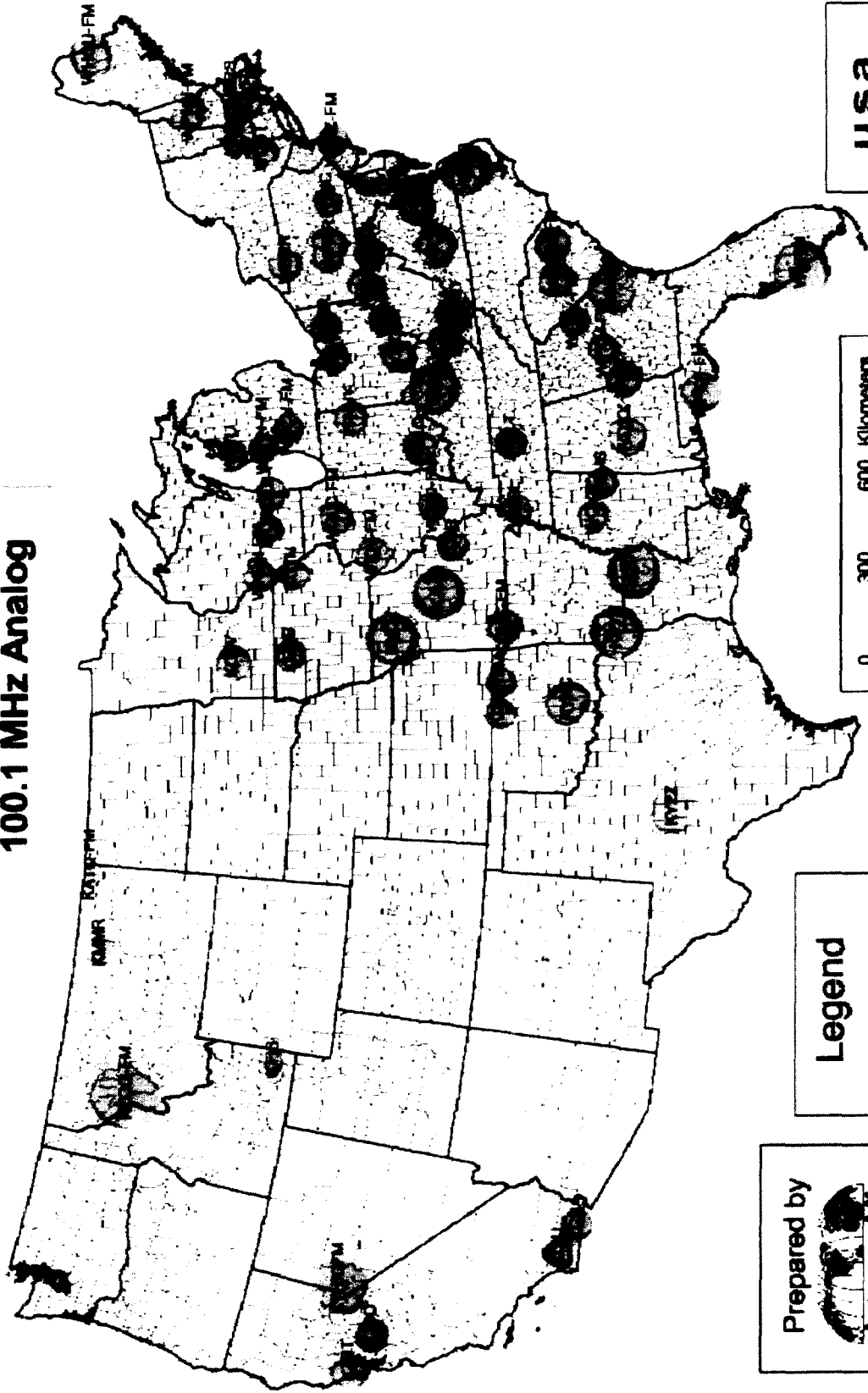


## Interference Coverage

0 200 400 Miles

**USA  
DIGITAL  
RADIO**

# 100.1 MHz Analog



Prepared by



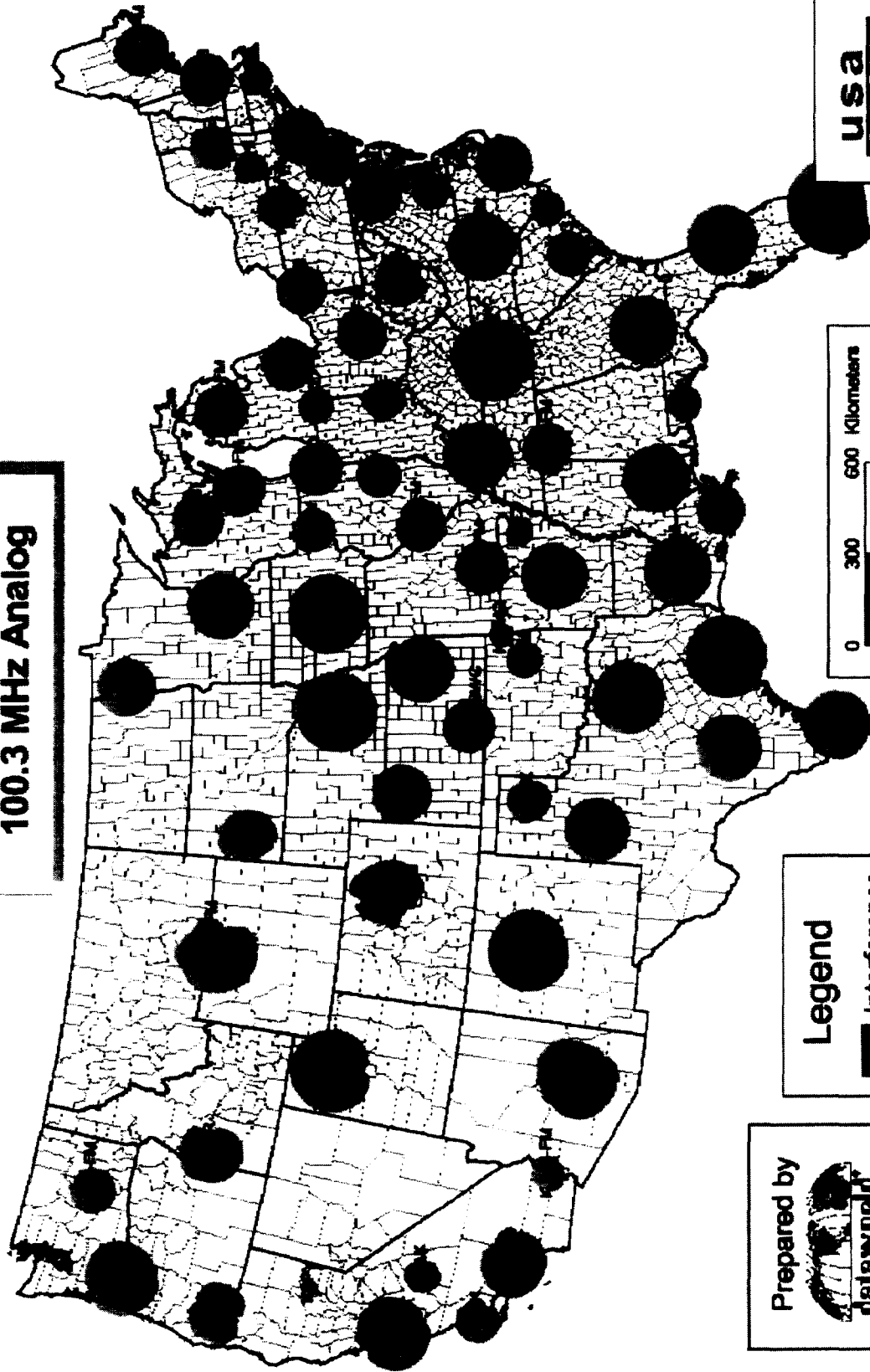
## Legend

Interference  
Coverage

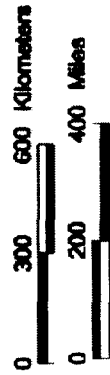
0 300 600 Kilometers  
0 200 400 Miles

usa  
DIGITAL  
RADIO

# 100.3 MHz Analog



usa  
DIGITAL  
RADIO



Legend  
Interference  
Coverage

Prepared by



## Summary and Conclusions

To assess the FM interference environment in the first phase, distance separation studies on all stations in the US in the non-reserved band were performed. From these studies, various types and combinations of interference were reviewed. A selection of the ten worst case stations was made and detailed interference studies were completed on these stations. For the very worst case stations, losses in areas and populations can approach and exceed 50 percent of the area or population within the station's normally protected contour. Based on the distance separation studies and interference studies, detailed interference studies were completed for three "best" case and three "average or typical" case stations. Average case station lose approximately 40 percent of the potential coverage within the predicted noise limited contour, but receive little or no interference within the protected contour. Although there are stations that receive no interference within the noise limited contour, these stations tend to be in rural and mountainous areas. However even in some major markets there are "best" cases that receive relatively little interference within the noise limited contour

It is evident from the FM studies conducted on the behalf of USADR that interference generally limits existing analog service. The majority of stations are not affected by interference within their protected contours, however there are a small percentage of stations that are severely impacted. Interference is generally wide spread within most noise limited service areas. Any DAB system, including a hybrid system such as USADR's, must take interference constraints into account in order to operate successfully.

Supplement A

Remaining Worst Case Interference Studies

The interference maps and area and population counts for the remaining seven "worst case" interference cases follow.

## PREDICTED ANALOG INTERFERENCE TO WQXA - FM CH 289B YORK, PA

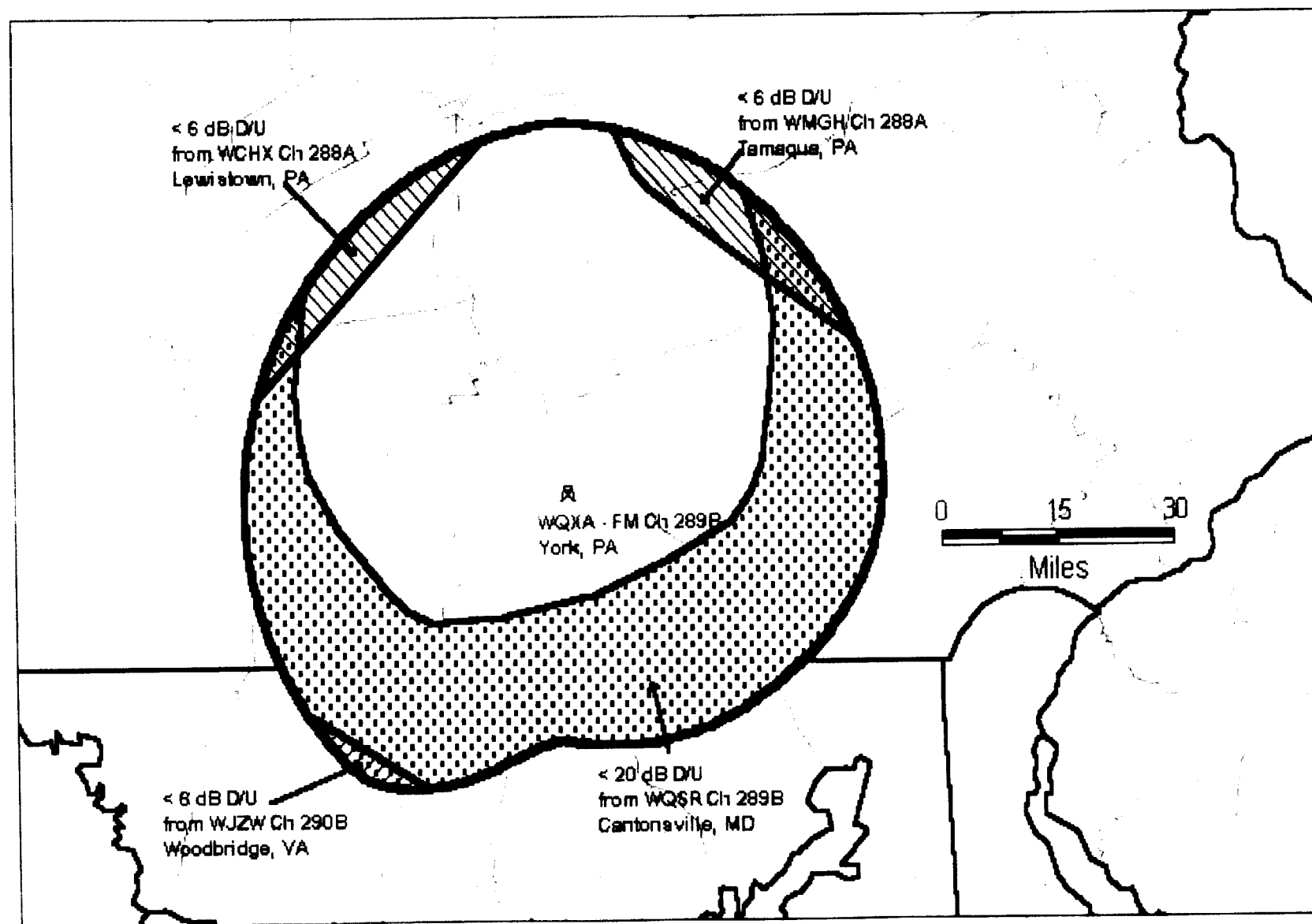


Figure A-1

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**PREDICTED ANALOG INTERFERENCE TO WQXA- FM CH 229B YORK, PA**

**Within WQXA-FM 54 dBu: 1,527,969 persons in 4738 sq. mi.**

<b>Interference from Station:</b>	<b>Affected area sq. mi:</b>	<b>% of Total:</b>	<b>Affected Population:</b>	<b>% of Total:</b>
WQSR	2007	42.4	375,892	24.6
WMGH	178	3.8	29,332	1.9
WCHX	127	2.7	14,598	1.0
WJZW	32	0.7	4,303	0.3

## PREDICTED ANALOG INTERFERENCE TO WRKS CH 254B NEW YORK, NY

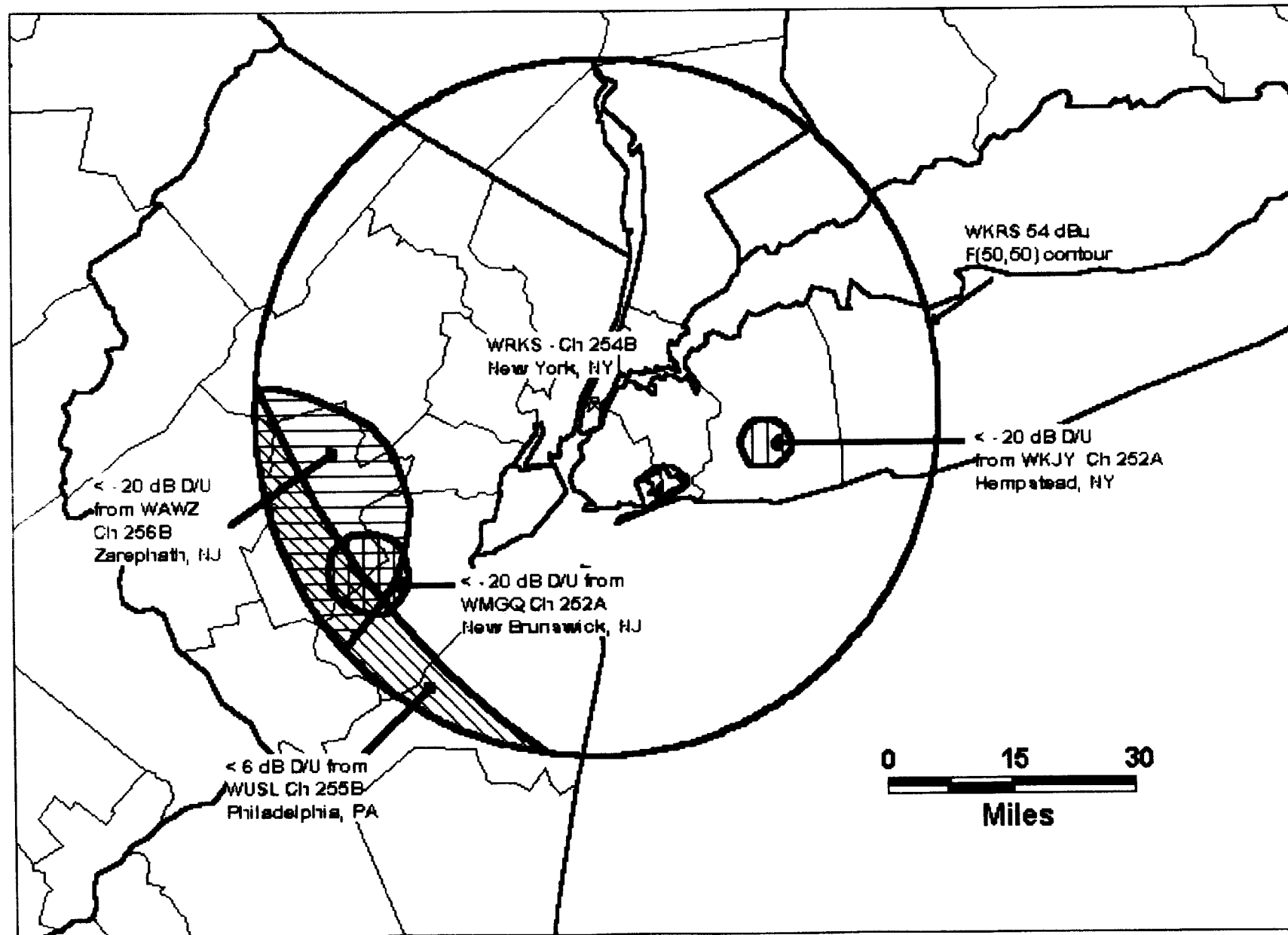


Figure A-2

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**PREDICTED ANALOG INTERFERENCE TO WRKS-FM CH 254B NEW YORK, NY**

**Within WRKS 54 dBu: 14,291,295 persons in 4068 sq. mi.**

<b>Interference from Station:</b>	<b>Affected area sq. mi:</b>	<b>% of Total</b>	<b>Affected Population:</b>	<b>% of Total:</b>
WAWZ	370	9.1	251,581	1.8
WUSL	283	7.0	122,864	0.9
WMGQ	71	1.7	41,630	0.3
WKJY	268	6.6	212,769	1.5

## PREDICTED ANALOG INTERFERENCE TO KLBJ - FM CH 229C AUSTIN, TX

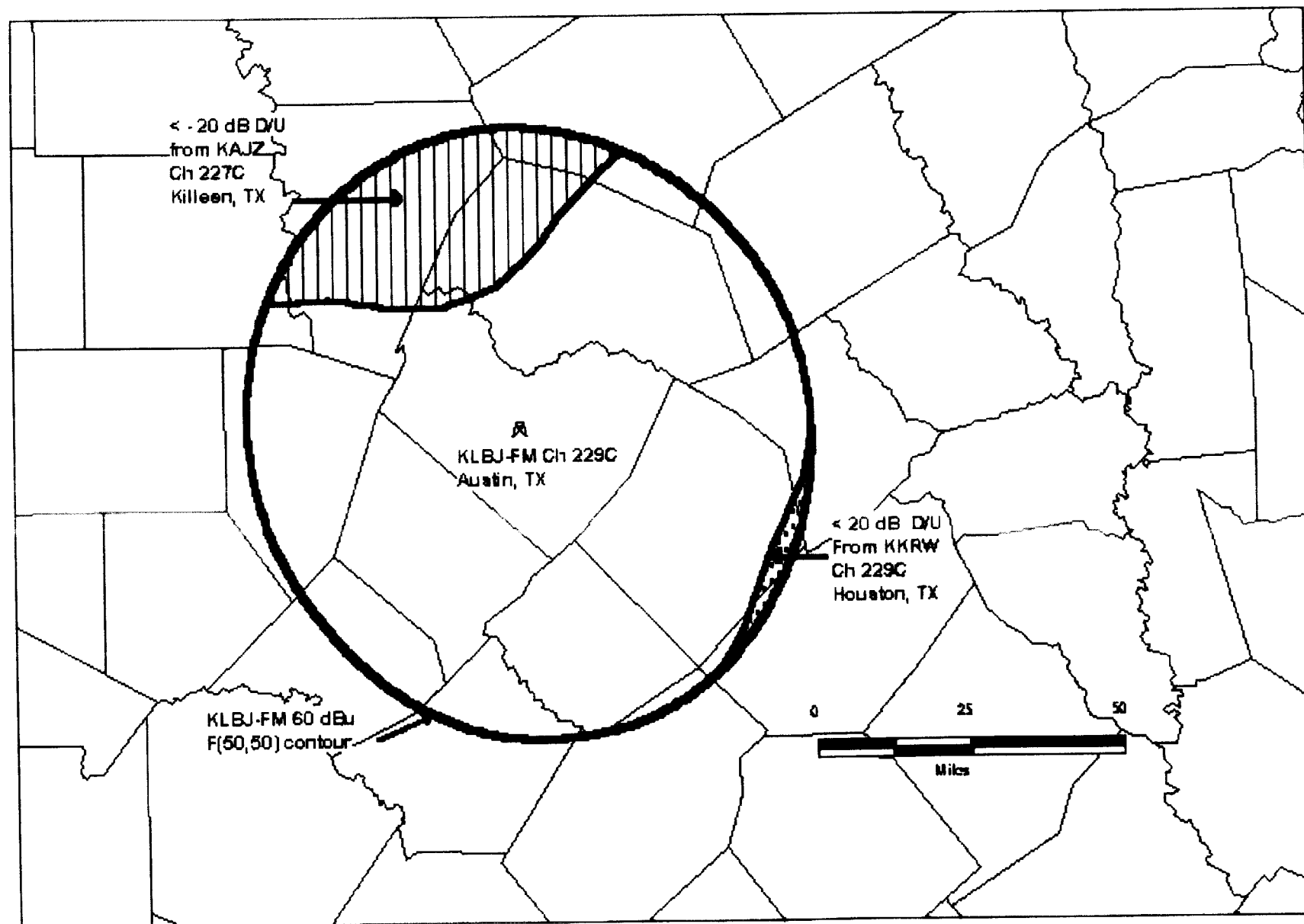


Figure A-3

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**PREDICTED ANALOG INTERFERENCE TO KLBJ-FM CH 229C AUSTIN, TX**

**Within KLBJ-FM 60 dBu: 901,547 persons in 6647 sq. mi.**

<b>Interference from Station:</b>	<b>Affected area sq. mi:</b>	<b>% of Total:</b>	<b>Affected Population:</b>	<b>% of Total:</b>
KAJZ	939	14.1	22,191	2.5
KKRW	85	1.3	1,024	0.1

# PREDICTED ANALOG INTERFERENCE TO WQMG CH 246C GREENSBORO, NC

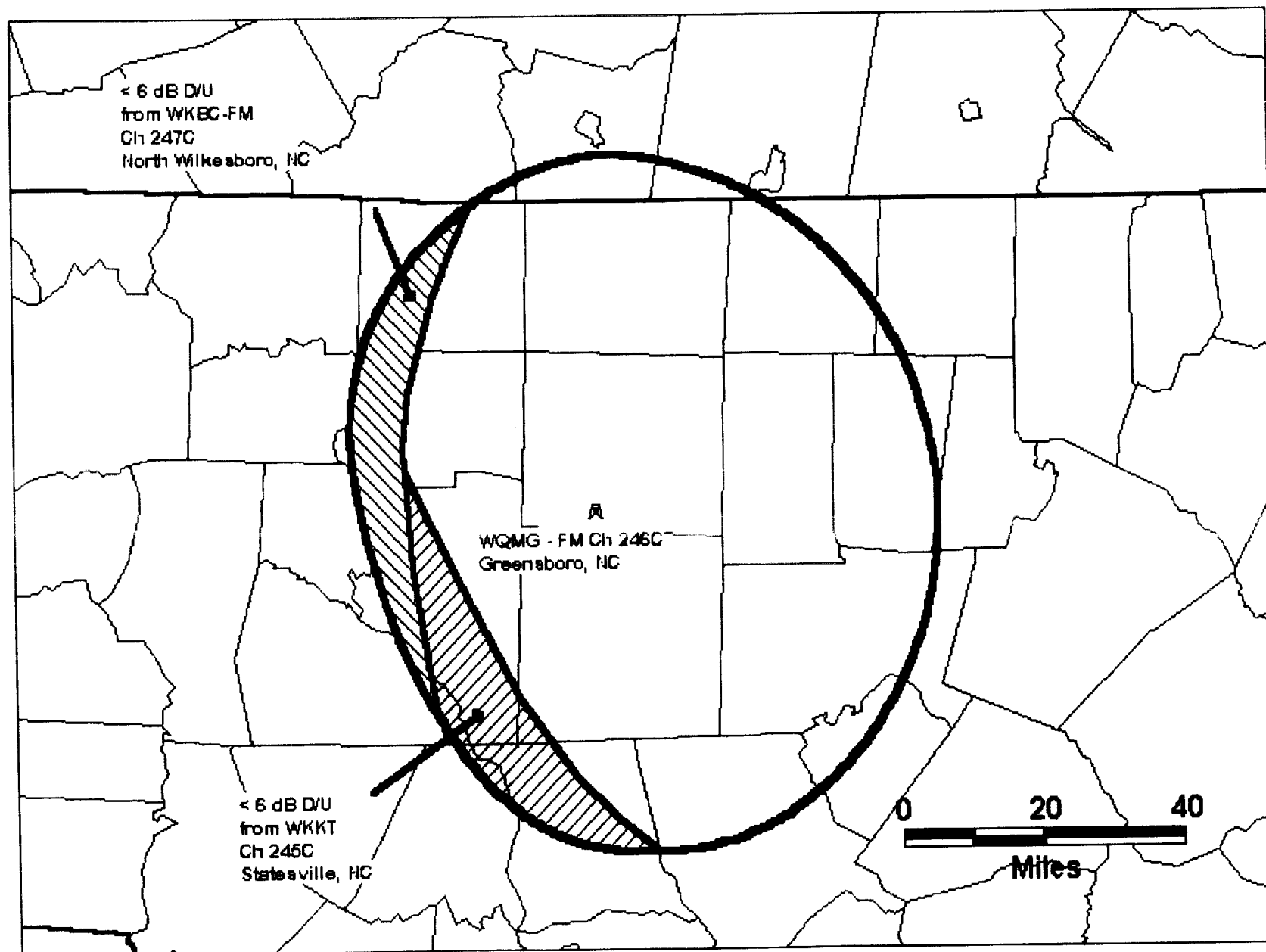


FIGURE A-4

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**PREDICTED ANALOG INTERFERENCE TO WQMG-FM CH 246C GREENSBORO, NC**

**Within WQMG-FM-60dBu: 1,268,431 persons in 5916 sq. mi.**

<b>Interference from Station:</b>	<b>Affected area sq. mi:</b>	<b>% of Total:</b>	<b>Affected Population:</b>	<b>% of Total:</b>
WKKT	670	11.3	106,144	8.4
WKBC	363	6.1	82,714	6.5

Stations WKBC and WKKT are upper and lower first adjacent channel stations to WQMG-FM. The area of predicted mutual interference from both stations contains 50,869 persons in 228 square miles. The percentages of the predicted WQMG-FM normally protected coverage area are 10.2 percent of the population and 12.3 percent of the area.

The WQMG-FM net interference free area contains 137,989 persons in 5114 square miles. Thus, the loss area is 802 square miles or 13.6 percent of the predicted WQMG-FM normally protected coverage area. The population within the predicted loss area is 137,989 persons or 10.9 percent of the predicted WQMG-FM normally protected coverage area.

# PREDICTED ANALOG INTERFERENCE TO WKBC - FM CH 247C NORTH WILKESBORO, NC

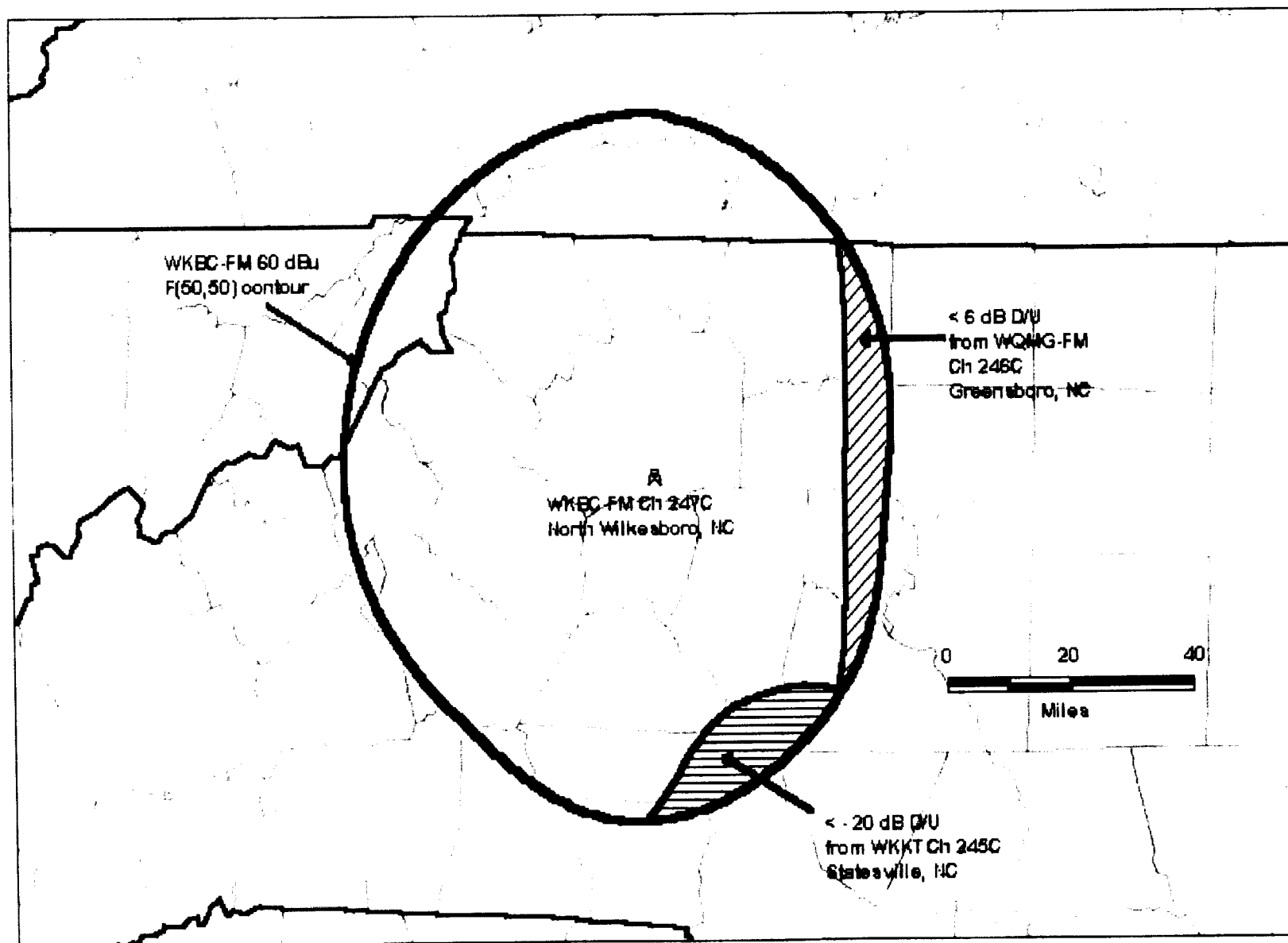


Figure A-5

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